

CLAIMS

1. A materials analysis system for testing a test material, including:
an oven, including:
a housing comprising at least one of a ceramic or a ceramic fiber; and
a heating element in communication with the housing and configured to transfer heat to an interior of the housing;
a control system configured to control the heating element; and
a mass measuring system connected to the control system and having a test material support associated with the oven housing.
2. A materials analysis system according to claim 1, wherein the control system is configured to control the heating element according to a first criterion when the interior of the housing is at a first temperature and according to a second criterion when the interior of the housing is at a second temperature.
3. A materials analysis system according to claim 2, wherein the control system is configured to control the heating element according to a feedback process, wherein the first criterion is a first constant used in the feedback process and the second criterion is a second constant used in the feedback process.
4. A materials analysis system according to claim 3, wherein the feedback process includes a PID algorithm.
5. A materials analysis system according to claim 1, wherein the control system is configured to control the heating element according to:
a weight change rate for the test material based on a signal from the mass measuring system; and

a predetermined ashing rate.

6. A materials analysis system according to claim 1, wherein the control system is configured to consecutively perform a loss-on-drying process to the test material and an ashing test to the test material.
7. A materials analysis system according to claim 1, wherein the control system is configured to control the heating element using a modulated signal having a variable period.
8. A materials analysis system according to claim 1, wherein the control system is configured to execute a self-cleaning process.
9. A materials analysis system according to claim 1, wherein the heating element comprises a radiative heating element.
10. A materials analysis system according to claim 1, wherein the test material support includes at least four prongs.
11. A materials analysis system for analyzing a test material, comprising:
an oven, including:
a housing including a ceramic; and
a radiative heating element;
a control system connected to the heating element and configured to control the heating element to execute at least one of a loss-on-drying process and an ashing process on the test material.
12. A materials analysis system according to claim 11, further comprising a mass measuring system connected to the control system and configured to weigh the test material in the oven.

13. A materials analysis system according to claim 11, further comprising a temperature sensor at least partially disposed within the oven housing and connected to the control system.
14. A materials analysis system according to claim 11, wherein the control system:
includes a memory configured to store multiple sets of constants, and
is configured to control the heating element according to different sets of constants retrieved from the memory when the interior of the housing is at different temperatures.
15. A materials analysis system according to claim 14, wherein the control system is configured to control the heating element according to a feedback process, wherein the different sets of constants are used in the feedback process.
16. A materials analysis system according to claim 15, wherein the feedback process includes a PID algorithm.
17. A materials analysis system according to claim 11, wherein the control system is configured to control the heating element to execute the ashing process according to:
to:
a weight change rate for the test material calculated by the control system based on a weight signal from the mass measuring system; and
a predetermined ashing rate associated with the test material.
18. A materials analysis system according to claim 11, wherein the control system is configured to consecutively perform the loss-on-drying process to the test material and the ashing test to the test material.

19. A materials analysis system according to claim 11, wherein the control system is configured to control the heating element using a frequency modulated signal.
20. A materials analysis system according to claim 11, wherein the control system is configured to control the heating element according to a target activation value and an actual activation value.
21. A materials analysis system according to claim 11, wherein the control system is configured to execute a self-cleaning process.
22. A materials analysis system according to claim 11, wherein the test material support includes at least four prongs.
23. A method of testing a test material, comprising:
 - determining an initial weight of the test material;
 - exposing the test material to a temperature in excess of 300°C in an oven;
 - measuring a change of the temperature in the oven;
 - measuring a change of weight of the test material; and
 - controlling a heating element for the oven according to at least one of the change of temperature in the oven and the change of weight of the test material.
24. A method of testing a test material according to claim 23, wherein controlling the heating element includes frequency modulating a power provided to the heating element.
25. A method of testing a test material according to claim 23, wherein controlling the heating element includes controlling the heating element in conjunction with a PID algorithm.

26. A method of testing a test material according to claim 25, wherein controlling the heating element includes:
- using a first set of constants in the PID algorithm when the temperature in the oven is within a first range; and
 - using a second set of constants in the PID algorithm when the temperature in the oven is within a second range.
27. A method of testing a test material according to claim 23, wherein controlling the heating element includes controlling the heating element in conjunction with a preselected ash rate for the test material.
28. A method of testing a test material according to claim 23, wherein controlling the heating element includes:
- determining a target activation value for the heating element;
 - determining an actual activation value for the heating element; and
 - deactivating the heating element according to a relationship between the target activation value and the actual activation value.